

Abstract

This is an update of a proposal for a coincidence measurement of K^+ and p from the reaction $\bar{\gamma}p \rightarrow K^+\bar{\Lambda}^0$, $\Lambda^0 \rightarrow p\pi^-$. We request 15 days of beam time in Hall A to measure the recoil $\bar{\Lambda}^0$ polarization components P_l , P_t , and P_n , and to obtain simultaneously the coincidence cross section, plus 2 days for energy changes and systematics checks.

Our aim is to investigate the reaction mechanism, at large momentum transfers and well above the resonance region. In our view, the most interesting possibility is that semi-phenomenological skewed parton distribution techniques will allow an explanation of the data, and will yield information about the spin structure of the nucleon and Λ^0 . The strength of this proposal is the use of the self-analyzing decay of the Λ^0 to probe the spin structure of the reaction mechanism at all accessible momentum transfers.

Spin structure information should provide severe constraints on possible physics models, but no high $-t$ polarization data exist for any photo-reaction. With the large luminosities available at CEBAF, we can now obtain excellent quality spin observables, and cross sections, at large $-t$, where quark models should be applicable.

The original version of this proposal was deferred by PAC 14. For PAC 16, we have revised the proposal based on the comments of PAC 14 and subsequent development work.

1 Introduction

This experiment, 98-106, was deferred by JLab PAC 14. At that time, we requested 27 days to measure cross sections and recoil Λ^0 polarizations in $K^+\bar{\Lambda}^0$ photo-production, for beam energies from 3 to 6 GeV and angles between 50° and 130° in the center of mass. Several concerns were expressed by PAC 14.

Since that time, we have continued development for the proposal, in particular by performing electro- vs. photo-production calculations and by performing a brief experimental test measurement. These results will be presented in more detail in the body of the proposal. The comments of PAC 14, along with brief responses to them, include the following: